

Application No.: 10/539,770

Docket No.: 4590-423

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of magnetic measurement of the position and the orientation of a mobile object with respect to a fixed structure, in which a first emitter assembly includes at least two orthogonal coils for emitting magnetic fields, integral with said fixed structure, which define a reference frame, and means of emission for injecting predetermined emission currents into said coils at first frequencies, in which a second sensor assembly includes at least two orthogonal coils for detecting magnetic fields, integral with said mobile object, sensor channels with servocontrol loops for producing in feedback coils coupled to said detection coils feedback magnetic fields by injection of measurement currents and a calibration channel for elaborating at least one calibration voltage, and in which at least one acquisition channel is provided for extracting measurement values of said emission channels, said sensor channels and said calibration channel and means of calculation and of processing estimate, on the basis of said measurement values, the magnetic fields detected in the second sensor assembly and deduce therefrom the position and the orientation of said mobile object in said reference frame, wherein the calibration voltage comprises only terms with at least two frequencies distinct from said first frequencies and comprising:

injecting calibration currents and voltages into said channels of the sensor so as to produce calibration measurement values identified by their frequency,

estimating by the means of calculation the transfer function of each of the sensor channels; and

deducing by said means of calculation the magnetic fields detected on the basis of said measurement values and of the inverse of said estimated transfer functions; and

outputting a signal representing the position and orientation of the mobile object based on the deduced magnetic fields.

2. (Previously Presented) The method as claimed in claim 1, wherein the servocontrol loops of the sensor channels provide output voltage (V_{c1} to V_{c3}) producing said measurement

Application No.: 10/539,770**Docket No.: 4590-423**

currents and said measurement currents flow through measurement resistors (R_{M1} to R_{M3}) so as to provide measurement voltages (V'_{c1} to V'_{c3}), wherein the calibration voltage is superimposed on said output voltages for the production of said measurement currents, and in that said step of estimating the transfer functions is performed, on the basis of the separation of the calibration frequency terms in said output voltages, by polynomial approximation for said first frequencies.

3. (Previously Presented) The method as claimed in claim 2, wherein the calibration currents are injected onto said measurement resistors and the value of the variable components of said channels of the sensors is identified on the basis of the separation of the calibration frequency terms in the output voltages and the measurement voltages.

4. (Previously Presented) The method as claimed in claim 3, wherein the separation of the calibration frequency terms and the measurement thereof is performed with the aid of a separate acquisition channel multiplexed in time so as to process during a calibration cycle the measurement voltages of the sensor channels, the emission currents, the calibration channel and the output voltages of the sensor channels.

5. (Previously Presented) A device for the magnetic measurement of the position and the orientation of a mobile object with respect to a fixed structure, comprising:

a first emitter assembly including at least two orthogonal coils for emitting magnetic fields, integral with said fixed structure and defining a reference frame, and means of emission for injecting predetermined currents into said coils at first frequencies and constituting with said coils at least two emission channels;

a second sensor assembly including at least two orthogonal coils for detecting magnetic fields, integral with said mobile object, means of measurement by servocontrol loops, for producing in feedback coils coupled to said detection coils feedback magnetic fields by injection of measurement currents and for constituting with said detection coils at least two sensor channels, and means of calibration comprising a calibration channel for elaborating at least one calibration voltage at second frequencies;

at least one acquisition channel for measurements for extracting measurement values of said emission channels, said sensor channels and said calibration channel; and means of calculation and processing for estimating, on the basis of said measurement values, the magnetic fields detected in the second sensor assembly and deducing therefrom the

Application No.: 10/539,770**Docket No.: 4590-423**

position and the orientation of said mobile object in said reference frame,

wherein said second frequencies are distinct from said first frequencies, in that said means of calibration are provided so as to inject calibration currents and voltages into said sensor channels so as to produce calibration measurement values identified by their frequencies and addressed to said means of calculation by acquisition channel or channels and in that said means of calculation and processing are provided so as to estimate the transfer function of each of the sensor channels and to deduce the magnetic fields detected from said measurement values and from the inverse of said estimated transfer functions.

6. (Previously Presented) The device as claimed in claim 5, wherein the said sensor channels each comprise a feedback coil coiled onto the same magnetic core as the associated detection coil, corrector amplifier means for generating on the basis of the signal at the terminals of the detection coil an output voltage, and amplifier/current generator means for elaborating a feedback current injected into the associated feedback coil and a feedback current measurement resistor traversed by said current so as to provide a measurement voltage, wherein the means of calibration furthermore comprise first means of injecting the calibration voltage onto said amplifier/current generator means and second means for injecting a calibration current proportional to said calibration voltage onto said measurement resistors.

7. (Previously Presented) The device as claimed in claim 6, wherein said acquisition channels comprise first acquisition channels for processing in continuous mode said measurement voltages respectively of each sensor channel, a sampled acquisition channel for processing in time multiplex mode the calibration signals present in said output voltages of the sensor channels, in the measurement voltages of these same channels and in the sum of the emission currents, and said emission currents; and means of multiplexing for applying said signals processed by the sampled acquisition channel onto the input of the latter.